

## CLAIMS

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

- 1 1. A car rental system comprising:  
2 a fleet of cars, each of which is operable only when a valid digital key  
3 is presented to the car, and each of said fleet of cars has a means to invalidate  
4 a digital key; and  
5 a management system for handling reservation and car return, said  
6 management system including:  
7 a key generation system for generating digital keys for renters of the  
8 car rental system;  
9 a key return system for processing digital keys returned by renters.
- 1 2. The system in claim 1, further comprising a parking lot guarded by a  
2 security gate, said fleet of cars being parked with confines of said parking lot  
3 when not rented by a renter of the car rental system, said security gate only  
4 opening when a valid digital pass is presented by a renter of the car rental  
5 system.
- 6 3. The system in claim 1, wherein the management system is accessed by a  
7 prospective renter over a network and the prospective renter is given a digital  
8 key to operate a particular car and a digital pass to open the gate of the parking  
9 lot where said particular car is parked, after said prospective renter completes  
10 a reservation for said particular car, said digital key and digital pass being  
11 effective starting from the time specified by said reservation.

1 4. The system in claim 3, wherein the prospective renter accesses the  
2 management system at a kiosk located in the parking lot where the particular  
3 car is parked.

1 5. The system in claim 3, wherein the prospective renter accesses the  
2 management system over the Internet.

1 6. The system in claim 3, wherein the key generation system stores a digital  
2 key on a storage device provided by a prospective renter.

1 7. The system in claim 6, wherein the storage device is a smart card.

1 8. The system in claim 6, wherein the digital key comprises car and user  
2 identification (ID) signed by the management system to authenticate the  
3 digital key.

1 9. The system in claim 1, wherein a renter of a car invalidates a valid digital  
2 key upon returning a car to the car rental system and presents an invalidated  
3 digital key to the key return system to complete a car return.

1 10. The system in claim 9, wherein the invalidation of a valid digital key  
2 includes storing car status information relevant to computing by the key return  
3 system a receipt for the renter.

1 11. A computer implemented method for operating a car rental system  
2 comprising the steps of:  
3       accessing a reservation server by a prospective car renter to reserve a  
4 car;  
5       authenticating the prospective car renter by the reservation server and,

6 upon the reservation server successfully authenticating the user, prompting the  
7 prospective car renter for the date, time, and location for pickup and return,  
8 and the type of car;

9 checking by the reservation server an availability of a requested car  
10 and, if a car is available, creating by the reservation server a digital key by car  
11 and user information with a digital signature of the reservation server; and  
12 downloading the digital key to a portable storage device, the portable  
13 storage device being used to gain access to a rental car.

1 12. The method in claim 11, wherein the step of accessing the reservation  
2 server is performed via a network.

1 13. The method in claim 12, wherein the network is the Internet.

1 14. The method in claim 11, wherein the step of authenticating a prospective  
2 car renter includes the steps of:

3 prompting the prospective car renter to enter a personal identification  
4 number (PIN); and

5 comparing the entered PIN with a valid PIN for the prospective car  
6 renter.

1 15. The method of claim 11, wherein the step of creating a digital key  
2 comprises the steps of:

3 computing a hash of the car renter's valid PIN;

4 combining car and renter identification with the hashed PIN; and

5 digitally signing the combined information by said reservation server.

1 16. The method in claim 11, further comprising the steps of:

2 inserting the portable storage device by a car renter into a slot for

1        18. The method in claim 17, further comprising the steps of:  
2                upon receiving a car renter's request to return a car, retrieving the  
3        return packet from the portable storage device;  
4                verifying a signature on the return packet; and

5 updating the car status and printing a receipt for the car renter.

1 19. The method in claim 11, wherein the portable storage device is a smart  
2 card.

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